AMENDMENTS TO THE SPECIFICATION

Applicants amend the specification as follows:

Page 3, paragraph [0006], replace with --- [0006] The present invention addresses the above-described deficiencies and others. Specifically, the present invention provides an apparatus for generating acoustic waves in a formation traversed by a wellbore including a multi-pole transmitter, the multipole transmitter comprising four monopole acoustic transmitter elements housed in a drill collar, the four monopole acoustic transmitter elements being spaced around a circumference of the drill collar at approximately equal intervals. The four multi-pole acoustic transmitter elements may be operated to create a monopole, dipole, or quadrupole pressure field. According to some embodiments, each of the four monopole transmitter elements includes a cylindrical transducer and a canister surrounding the transducer, with the canister and the cylindrical transducer filled with a fluid. The canister may be made of ~~Radel®-R~~RADEL®-R (polyphenylsulfone) and have a thickness of approximately 1mm. The cylindrical transducer may be a PZT piezo-ceramic transducer, which is used according to some embodiments as a tube resonator as well. A voltage is preferably supplied to the PZT piezo-ceramic transducer at a frequency lower than a resonant frequency of the piezo-ceramic transducer, and at a resonant frequency of the fluid in the piezo-ceramic transducer.---

Page 6, paragraph [0017], replace with ---[0017] FIG. 2B is a front view of a shield or cover plate shown in cross-section in FIG. 2~~A~~B and housing an acoustic transmitter element according to one embodiment of the present invention.---

Pages 7-8, paragraph [0023], replace with ---[0023] As used throughout the specification and claims, the terms "borehole" or "downhole" refer to a subterranean environment, particularly in a wellbore. "Drill string" means a combination of drillpipe, a bottomhole assembly, and any other tools used to make a drill bit turn at the bottom of the wellbore. "Drill collar" is used broadly to mean a thick-walled tubular component of a drillstring. "Uniform" or "uniformly" means routinely the same or consonant with another or others. "D33 effect" means the increase of the ceramic thickness in direction of the applied electrical field in piezo stack actuators and stacked piezo rings and "d31 effect" means an in-plane shrinking accompanying the thickness expansion (d33) of a PZT layer.

Pages 11-12, paragraph [0030], replace with --- [0030] Referring to FIG. 4, each PZT piezo ceramic cylinder (142) is sandwiched between first and second spacers (152, 154). The first and second spacers (152, 154) are made of ~~Radel® R~~ RADEL®-R (polyphenylsulfone) or other materials. The first and second spacers (152, 154) include holes (155) to avoid closing the ends of the PZT piezo ceramic cylinder (142). The first and second spacers (152, 154) are sandwiched by first and second heads (156, 158, respectively). The first and second heads are preferably comprises of a metal such as stainless steel. The first and second heads (156, 158) are connected to one another by one or more rods (160), which may also be made of stainless steel or other structural materials. The second head (158) may include a hole (162) leading to a pressure compensator, which, according to the embodiment of FIG. 4, is a bellows-type pressure compensator (164). The bellows-type pressure compensator (164) maintains or restores linearity between supplied voltage and output pressure, because without the compensator an increase in voltage supplied to the PZT piezo ceramic cylinder (142) often changes the waveform of the output pressure and breaks linearity.---

Pages 12-13, paragraph [0032], replace with --- [0032] The canister (170) is preferably made of a polymer such as ~~Radel® R~~ RADEL®-R (polyphenylsulfone), although metals or other materials may also be used for the canister. The ~~Radel® R~~ RADEL®-R (polyphenylsulfone) canister (170) is approximately 1 mm thick and provides superior transmission of pressure pluses generated by the PZT piezo ceramic cylinder (142, FIG. 4) as compared to metal canisters. The canister (170) and therefore the PZT piezo ceramic cylinder (142) are preferably substantially filled with a fluid, such as a silicon oil or other fluid. Therefore, the PZT piezo ceramic cylinder (142) may also be employed as a tube resonator to further enhance output pressure and/or reduce power consumption. Accordingly, in order to take advantage of fluid resonance, the PZT piezo ceramic cylinder (142) length is chosen to correspondingly control the fluid resonant frequency. For example, according to some embodiments, the fluid is silicon oil and the PZT piezo ceramic cylinder (142) is approximately 5 cm, resulting in a fluid resonant frequency of 10kHz. Similarly, using the same fluid and extending the length of the PZT piezo ceramic cylinder (142) to approximately 10 cm yields a fluid resonant frequency of 5kHz (without an open-end correction). The resonance frequency of the PZT piezo ceramic cylinder (142) is substantially higher than these fluid resonance frequencies, which allows the PZT piezo ceramic cylinder (142) to operate very efficiently without the need of any pre-stressing. In addition, resonance inside the PZT piezo ceramic cylinders (142) is prevented because the ends of the PZT piezo ceramic cylinders (142) are open.---

Page 23, ABSTRACT, replace with --- Methods and apparatus facilitating logging-while-drilling (LWD) using a multi-pole acoustic transmitter source. The multi-pole transmitter source enables measurement of formation velocities, including shear wave velocities through formations that are slower than velocities through local fluids. The methods and apparatus ~~are particularly well-suited~~ may be utilized for LWD and wireline seismic surveys in which both the seismic or acoustic source and receivers are both deployed in a borehole, but may also be used for VSPs (vertical seismic profiling).---